JAPAN

EDICT OF GOVERNMENT

In order to promote public education and public safety, equal justice for all, a better informed citizenry, the rule of law, world trade and world peace, this legal document is hereby made available on a noncommercial basis, as it is the right of all humans to know and speak the laws that govern them.

JIS B 6515 (1989) (English): Test methods for performance and accuracy of tenoning machines

安 倂

The citizens of a nation must honor the laws of the land.

Fukuzawa Yukichi

BLANK PAGE

BLANK PAGE

UDC 621.913.001.41:674.05

JIS

JAPANESE INDUSTRIAL STANDARD

Test Methods for Performance and Accuracy of Tenoning Machines

JIS B 6515—1989

Translated and Published

by

Japanese Standards Association

In the event of any doubt arising,
the original Standard in Japanese is to be final authority.

UDC 621.913.001.41:674.05

JAPANESE INDUSTRIAL STANDARD J I S

Test Methods for Performance and Accuracy of Tenoning Machines

B 6515-1989

1. Scope

This Japanese Industrial Standard specifies the testing methods related to functions, running performances and rigidity and methods of inspection on static accuracies and machining accuracies of vertical spindle tenoners specified in No. 6411, horizontal spindle tenoners specified in No. 6412, and multi-head tenoners specified in No. 6413, hereinafter referred to as the "tenoners" of JIS B 0114, the maximum length of processible tenons of which are not more than 100 mm.

Remark: In this Standard, units and numerical values given in { } are in accordance with the conventional units, and are appended for informative reference.

2. Methods for Functional Tests

The functional tests for the tenoners shall be in accordance with Table 1.

Applicable Standards:

JIS B 0114-Glossary of Terms for Wood Working Machinery

JIS B 6507-General Code of Safety for Wood Working Machinery

JIS B 6521-Methods of Measurement for Noise Emitted by Wood Working Machinery

Reference Standards:

JIS B 6501-Test Code for Performance and Accuracy of Wood Working Machinery

JIS Z 8203-SI Units and the Use of their Multiples and of Certain other Units

Table 1. Functional Tests

No.	Test item	Test method
1	Electric apparatus	Before and after the running test, examine the insulating condition once each.
2	Start, stop and running operation of main spindle	At an appropriate spindle speed of rotation, carry out 10 times of start and stop continuously to examine the smoothness and reliability of actions.
3	Changing operation of spindle speed of rotation	Change the spindle speed of rotation in respect to entire marked speeds of rotation to examine the smoothness of the actions of operating device and the reliability of indications.
4	Changing operation of feed speeds	Change the speeds in respect to entire marked feed speeds to examine the smoothness of actions and reliability of indications of the operating device.
5	Manual feed operation	Examine the smoothness and uniformity of actions on the overall length of motion by the hand feed handle, and, in addition, rotate the sensitive hand feed handle several times to examine the smoothness and uniformity.
6	Operations of travel and clamping of spindle head	Allow the main spindle head to travel to examine the smoothness and uniformity of actions throughout overall length of the motion, and examine the reliability of clamping and the smoothness of actions of clamping device at the both ends and centre of the motion.
7	Travel of table	Allow the table to travel, and examine the smoothness and uniformity of actions throughout overall length of the motion.
8	Inclining and clamping operations of table	Incline the table, and examine the smoothness and uniformity of actions throughout the overall length of the motion. Furthermore, at the both ends and centre of the motion, examine the reliability of clamping and smoothness of the action of clamping device.
9	Attaching and detaching of tools	Examine the reliability and smoothness of attaching, detaching and clamping of tools.
10	Attaching and detaching of workpieces	Examine the reliability and smoothness of attaching, detaching and clamping of workpieces.
11	Safety device	Examine the reliability of the safety functions for workers and machine protection functions (see JIS B 6507).

Table 1. (Continued)

No.	Test item	Test method
12	Lubricating device	Examine the reliability of functions such as oil tightness and proper distribution of oil quantity.
13	Oil hydraulic equipment	Examine the reliability of functions such as oil tightness and pressure regulation.
14	Pneumatic pressure equipment	Examine the reliability of functions such as air tightness and pressure regulation.
15	Accessories	Examine the reliability of functions.

Remark: For those tenoners which are not provided with some functions concerned, the equivalent test items given in this Table 1 shall be omitted.

3. Methods of Running Tests

3.1 No-Load Running Test Rotate the main spindle, continue running for 30 to 60 min, measure the required electric power and noises after the bearing temperature has become stable, and record on respective items specified in the Record Format 1 of Table 2. In parallel to this, observe by sense of touch that no abnormal vibration exists.

Furthermore, the measurement of the noises shall be in accordance with JIS B 6521.

Table 2. Record Format 1

No.	Time of measurement o'clock, minute	Temperature °C													Required power			Noise dB (A)	Description
		Speed of rotation of main spindle (1) $\frac{min^{-1}}{\{rpm\}}$		Saw bearing		Upper horizontal-cutter bearing		Lower horizontal-cutter bearing		Upper vertical cutter bearing		Lower vertical cutter bearing		Room temperature	Voltage V	Current A	Input kW		
		Marking	Actual measurement	Left	Right	Left	Right	Left	Right	Upper	Lower	Upper	Lower						

Note ([1]) For a tenoner with two or more spindles, measurements shall be made on all of the spindles.

Remarks 1. For that tenoner which is provided with the speed changing device of spindle speed of rotation, it shall be recorded in respect to the rotational speeds of at least two levels, including the maximum speed of rotation.

2. Regarding the measuring conditions of noises, these shall be recorded on the description column.

3.2 Load Running Test Carry out the cutting of test material, measure the required power and noises, and record on respective items specified in the Record Format 2 of Table 3. In parallel with this, observe by sense of touch that no abnormal vibration exists and the conditions of the cut faces.

In the measurements of the required electric power, tests shall be carried out by changing the lengths of cut tenon of the test material at a constant feed speed, or by changing the feed speeds at a constant length of cut tenon of the test material.

Table 3. Record Format 2

No.	Test material					Tool							Cutting condition					Required electric power						
	Dimensions			Type of tree or type of wood	Water content g	Names of spindle	Diameter mm	Thickness mm	Setting width mm	Number of tooth	Shape of tooth	Material of cutting edge	Speed of rotation of spindle $\mathrm{min^{-1}}$ (rpm)	Cutting speed m/min	Feed speed m/min	Cutting length of tenon mm	Depth of cut mm	Voltage V	Current A	Input		Cutting power $P_1 - P_0$ kW	Noise dB (A)	Description
	Length mm	Width mm	Thickness mm																No load P_0 kW	Load P_1 kW			
						Saw spindle					Appended otherwise													
						Upper side cutter spindle																		
						Lower side cutter spindle																		
						Upper vertical cutter spindle																		
						Lower vertical cutter spindle																		

Remarks 1. The cutting direction of test material and measuring conditions of noises shall be recorded in the description column.

2. For the shape of tooth, main dimensions shall be given in illustration.

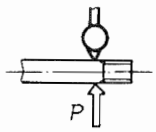
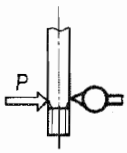
3. The names of spindles may be altered according to type of machine.

4. Regarding that of a manual machine, required electric power may not be measured.

4. Methods of Rigidity Tests

The rigidity tests of the tenoners shall be in accordance with Table 4.

Table 4. Rigidity Tests

No.	Test item	Measuring method	Figure for test method
1	Flexural rigidity of saw spindle and horizontal cutter spindle system	Apply a fixed test indicator to the end (side face) of the saw spindle or horizontal cutter spindle, apply loads (P) which is confronting with the former to the saw spindle or horizontal cutter spindle vertically(2), and measure the deflection of the saw spindle or horizontal cutter spindle. Carry out this measurement in vertical and horizontal directions each.	
2	Flexural rigidity of vertical cutter spindle system	Apply a fixed test indicator to the end (side face) of the vertical cutter spindle, apply loads (P) which is confronting to the former horizontally (2), and measure the deflection of the vertical cutter spindle. Carry out this measurement, in the left and right and front and rear directions each.	

Note (2) The position to which the load is to be applied should be the nearer position to the spindle end as far as possible, and the distance from the spindle end is to be recorded.

Remarks 1. For the rigidity tests on the machines of the same design, the test results obtained from a representative set may be allowed to represent these, and others may be exempted from testings.

2. Regarding the magnitude of the load (P), carry out the tests applying the recommended load (P) by the manufacturer, and record the load (P).

3. Carry out the measurements, after the bearing temperatures have been stabilized by rotating the spindles.

5. Methods of Inspection on Static Accuracies

The inspections on the static accuracies of the tenoners shall be in accordance with Table 5.

Table 5. Inspections on Static Accuracies

Unit: mm

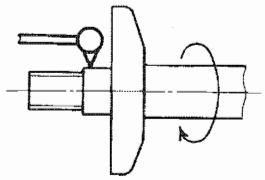
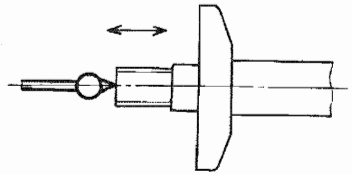
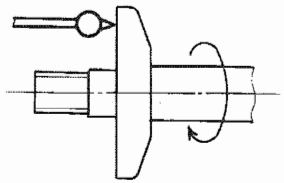
No.	Inspection item	Measuring method	Figure for measuring method	Permissible value
1	Runouts for saw spindle and cutter spindle	Rotate the saw spindle or cutter spindle manually while applying a test indicator to the outer peripheral surface of the mounting part of the circular saw or cutter spindle, and consider the maximum difference of the readings of the test indicator during rotation to be the measured value.		0.03
2	Movement in axial direction of saw spindle and cutter spindle	Apply a test indicator to the top end of saw spindle or cutter spindle face, shake the saw spindle or cutter spindle manually(3) in the axial direction, and consider the maximum difference of the readings of the test indicator to be the measured value.		0.05
3	Runouts for flange faces of saw spindle and cutter spindle	Rotate the saw spindle or cutter spindle manually while applying a test indicator to the flange face, and consider the maximum difference of readings of the test indicator during rotation to be the measured value.		0.02 per 50 of diameter

Table 5. (Continued)

Unit: mm

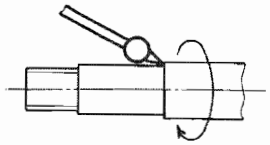
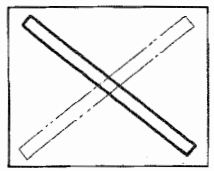
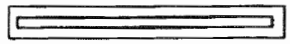
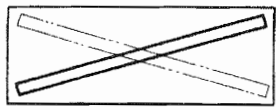
No.	Inspection item	Measuring method	Figure for measuring method	Permissible value
4	Runout of shoulder of cutter spindle	Apply a test indicator to the shoulder, rotate the cutter spindle manually, and consider the maximum difference of readings of the test indicator during rotation to be the measured value.		0.02 per 50 of diameter
5	Straightness of table upper face	Place the straightedge(4) of 500 mm on diagonal lines of the upper face of the table, measure clearances with a feeler gauge, and consider the maximum value to be the measured value.		0.05 per 500
6	Straightness of rail sliding face	Place the straightedge (4) of 500 mm on the rail sliding face, measure the clearances with a feeler gauge, and consider the maximum value to be the measured value.		0.04 per 500
7	Straightness of ruler face	Place a straightedge on the diagonal line of the ruler face, measure clearnces with a feeler gauge, and consider the maximum value to be the measured value.		0.05 per 500

Table 5. (Continued)

Unit: mm

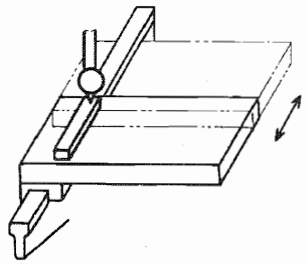
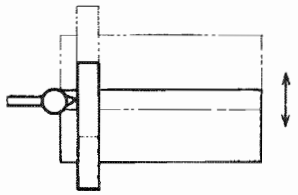
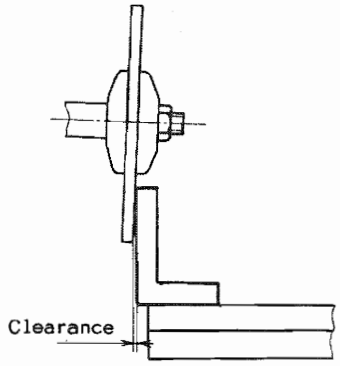
No.	Inspection item	Measuring method	Figure for measuring method	Permissible value
8	Parallelism of table upper face to rail slide face	Place a straightedge on the spindle side of table upper face, apply a test indicator to this, allow the table to travel, and consider the maximum difference of readings of the test indicator to be the measured value.		0.05 per 300
9	Straightness of front and rear motion of table	Place a straightedge on the table upper face in parallel with the travelling direction of the table(5), apply a fixed test indicator to this, allow the table to travel in front and rear, and consider the maximum difference of readings of the test indicator to be the measured value.		0.04 per 300
10	Perpendicularity of saw spindle flange face to table upper face	Attach a test plate to the flange face, place a straightedge on the table upper face, stand a square on this, apply it to the test plate face, measure the clearances with a feeler gauge, and consider the maximum value to be the measured value(6).		0.04 per 100

Table 5. (Continued)

Unit: mm

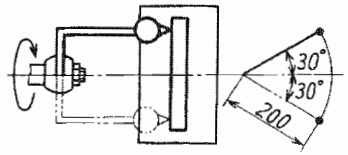
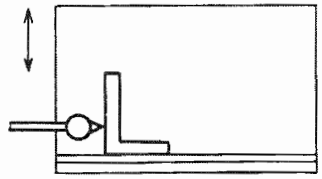
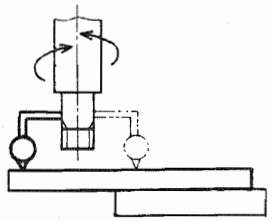
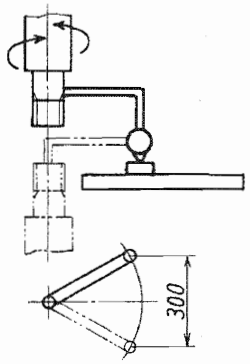
No.	Inspection item	Measuring method	Figure for measuring method	Permissible value
11	Perpendicularity of front and rear motion to saw spindle centre line and to horizontal cutter spindle centre line	Place a straightedge on the table upper face in parallel to the travelling direction of the table(5), apply a test indicator which has been fixed to the saw spindle or horizontal cutter spindle to the straightedge, swing this about 30° to the left and right respectively, and consider the maximum difference of readings of the test indicator to be the measured value.		0.04 per 200 of swing radius
12	Perpendicularity of front and rear motion of table to ruler face	Place a square, being brought down, on the upper face of table, apply its one side to the ruler face, apply a test indicator to another side of the square, allow the table to travel in front and rear, and consider the maximum difference of the readings of the test indicator to be the measured value.		0.04 per 100

Table 5. (Continued)

Unit: mm

No.	Inspection item		Measuring method	Figure for measuring method	Permissible value
13	Perpendicularity of centre line of vertical cutter spindle to table upper face	Left and right direction	Place a straightedge on the upper face of table in left and right direction, apply a test indicator being fixed to the vertical cutter spindle, swing 180°, and consider the maximum difference of readings of the indicator to be the measured value.		0.08 per 300 of swing diameter
		Front and rear direction	Place a straightedge on the upper face of table in front-and-rear direction, apply a test indicator being fixed to the vertical cutter spindle to this and swing, and consider the maximum difference of the readings of the test indicator to be the measured value.		0.06 per 300

Notes (3) The force to shake this in an axial direction shall be approximately 150 N {approx. 15 kgf}.

(4) Where the measuring distance is smaller than of the reference, the measured permissible value shall be converted in proportion to the distance.

(5) The straightedge shall be so adjusted that the readings of the test indicator coincide at the both ends of the table traverse distance.

(6) In this measurement, it shall be made by applying the square to a position so that the influence of the runout of the flange face is to be minimized.

Remark: For those tenoners which are not provided with some functions concerned, the equivalent inspection items given in Table 5 shall be omitted.

6. Methods of Inspection on Machining Accuracies

The machining accuracy inspections for the tenoners shall be in accordance with Table 6.

Table 6. Machining Accuracy Inspections

Unit: mm

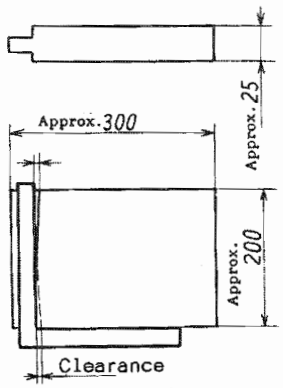
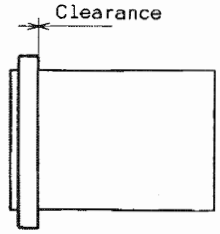
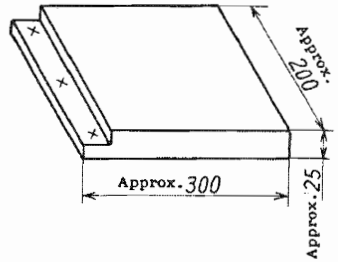
No.	Inspection item	Measuring method	Figure for measuring method	Permissible value
1	Perpendicularity of end face to shoulder face	Apply the end face(7) of a test material to a ruler, apply a square to the end face and cut face after one end has been processed with tenoning, measure clearances with a feeler gauge, and consider the maximum value thereof to be the measured value. Carry out this measurement on all of the combinations which have used the upper vertical cutter spindle and lower vertical cutter spindle, upper horizontal cutter spindle and lower horizontal cutter spindle, and upper vertical cutter spindle, lower vertical cutter spindle, upper horizontal cutter spindle and lower horizontal cutter spindle.		0.10 per 200

Table 6. (Continued)

Unit: mm

No.	Inspection item	Measuring method	Figure for measuring method	Permissible value
2	Straightness of shoulder surface	Apply a straightedge to the shoulder surface of the tenon of the foregoing test material, measure clearances with a feeler gauge, and consider the maximum value to be the measured value.		0.10 per 200
3	Accuracy of thickness of tenon	Apply a ruler to the end face(7) of a test material, cut its one end in stepwise shape, measure the thickness of remaining part of cut-off at 3 places of centre and both ends with a vernier calipers, and consider the maximum difference to be the measured value. Carry out this measurement on the test material which has been cut by each cutter spindle.		0.10

Note (7) The narrower face in width of the faces of material.

Remarks 1. The test material shall be processed with necessary processing in advance.

2. The dimensions of tenon shall be approximately 30 mm in length and approximately 10 mm in thickness.

B 6515-1989
Edition 1

Japanese Text

Established by Minister of International Trade and Industry

Date of Establishment: 1962-01-01

Date of Revision: 1989-01-01

Date of Public Notice in Official Gazette: 1989-01-05

Investigated by: Japanese Industrial Standards Committee

Divisional Council on General Machinery

This English translation is published by:
Japanese Standards Association
1-24, Akasaka 4, Minato-ku,
Tokyo 107 Japan

**Printed in Tokyo by
Hohbunsha Co., Ltd.**